



GE Energy Connections  
Power Conversion



GE's Power Conversion business:  
Having the right partner is as vital  
as having the right technology.

# Industrial Generators

2.5MW to 80MW

Power When It Matters.

[www.gepowerconversion.com](http://www.gepowerconversion.com)

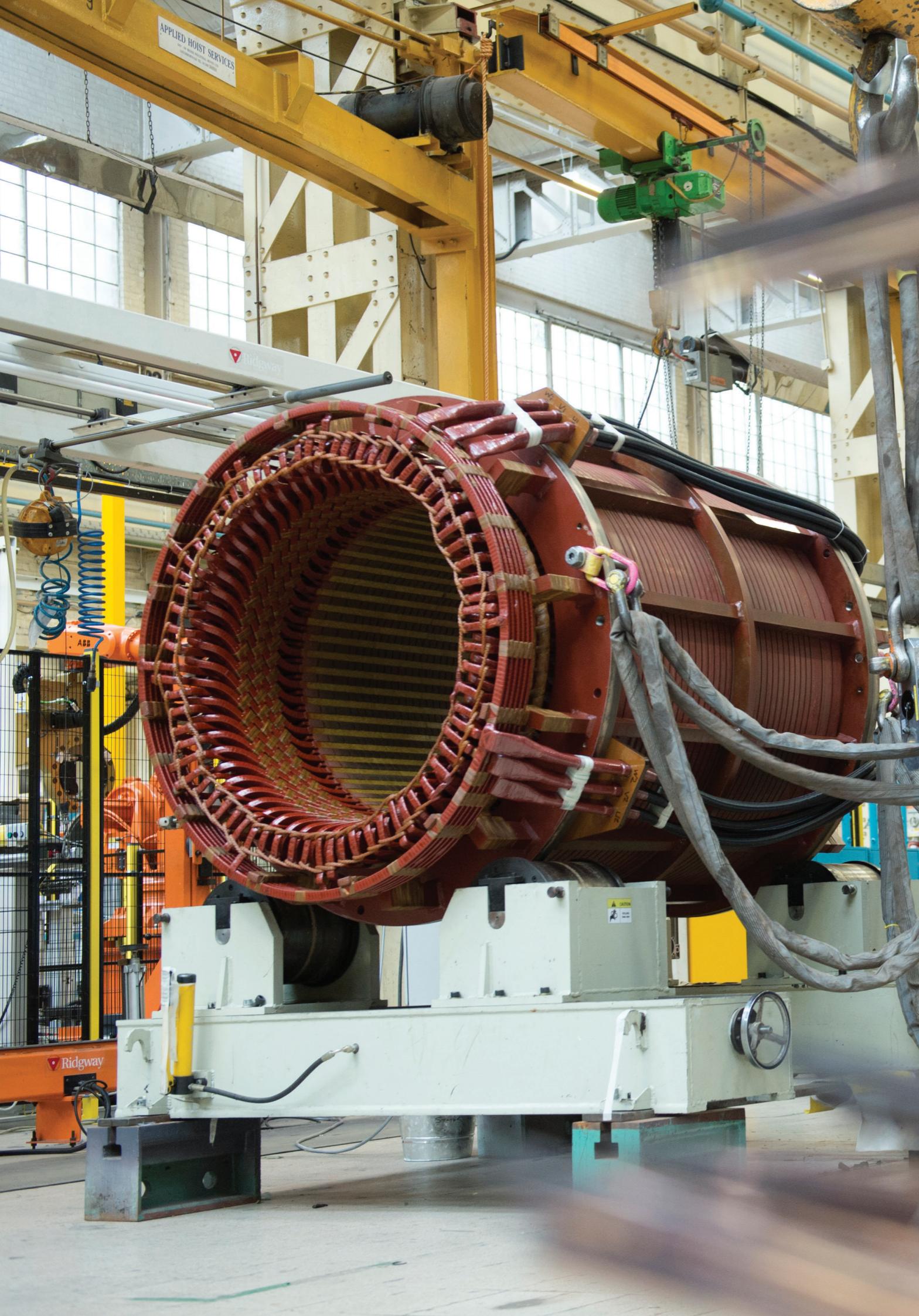
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GEA32439 (07/2016) GEPC Industrial Generators - Power When It Matters

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Efficiency and Quality at the Heart of Power Generation

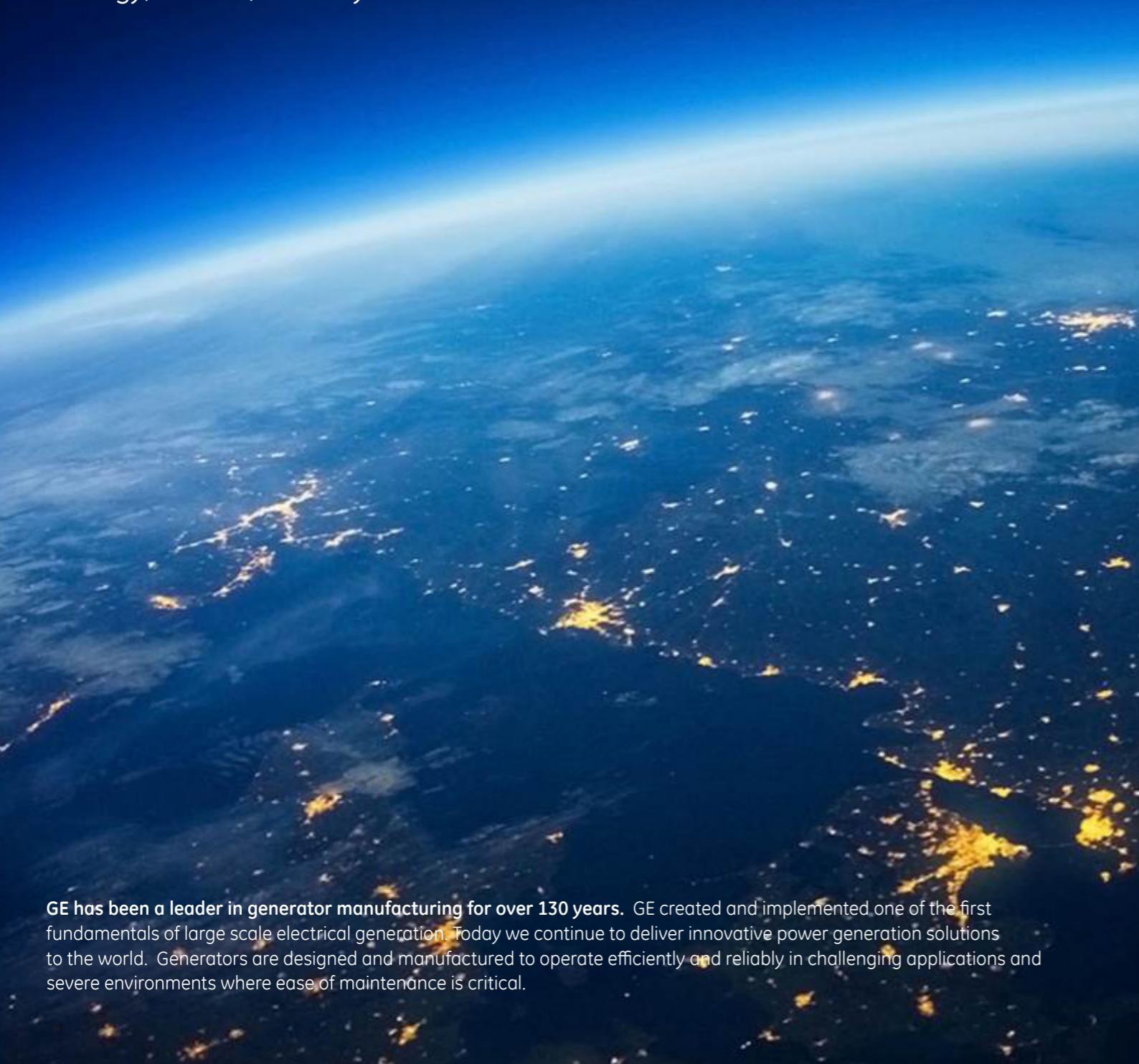


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# About Power Conversion

We are at the heart of efficiently connecting electricity to industry. We build industry-leading technologies and integrated solutions. Designing and delivering advanced motor, generator, drive and control technologies that evolve today's industrial processes for a cleaner, more productive future, it serves specialized sectors such as energy, marine, industry and all related services.



**GE has been a leader in generator manufacturing for over 130 years.** GE created and implemented one of the first fundamentals of large scale electrical generation. Today we continue to deliver innovative power generation solutions to the world. Generators are designed and manufactured to operate efficiently and reliably in challenging applications and severe environments where ease of maintenance is critical.

# Energy Industry Overview

A changing landscape

## GLOBAL ENERGY DEMAND

Energy consumption is rapidly growing in virtually every economy in the world. In fact, experts predict that the world's electrical demand will increase 48% by 2040 with 85% of this growth attributed to developing countries. With aging grid infrastructure and a rise in micro-grids and renewables, and with increasing demands for efficiency by heavy power users, there's a growing need for products and solutions that help energy providers bring reliable and efficient power to more people.

## RISE IN CLEAN AND RENEWABLE ENERGY SOURCES

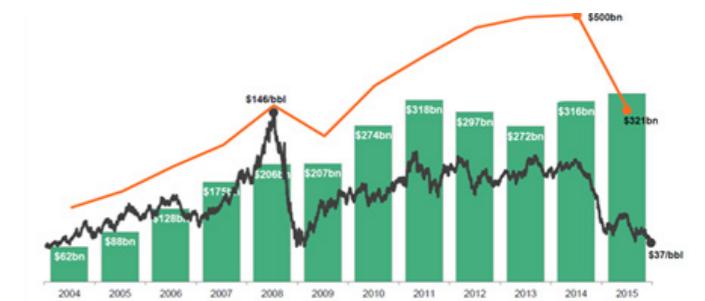
In the power generation sector, a lot has changed in the last 15 years. In the coming years, renewable energy will play a significantly greater role globally and clean energy sources have seen continued growth in investment. As more renewables enter the market, project developers and operators are faced with the challenge of optimizing investment performance.

This means controlling costs, attaining the highest energy yields, complying with rigorous grid rules, and ensuring efficient transfer of energy onto the grid. There is also the challenge of managing grid stability.

## OIL PRICE VOLATILITY DRIVES CAPEX DECLINE

Driven by a rise in new reserves, particularly shale oil in the US, it is estimated that the increase in the global supply of liquid fuels was almost twice that of consumption in 2014. Slower growth in China and Europe, the absence of an OPEC production cut in response to lower oil prices and the emergence of alternative energy sources has resulted in a supply and demand imbalance in the wider market. With more pressure on revenues and profits as a result of the decline in prices, operators have slashed operating costs, cancelled the development of new wells that are no longer viable and are heavily cutting investment plans. According to Goldman Sachs, the energy sector's capital expenditure, or capex, has slumped 8% this year and capex investments are expected to decline still. This cut in spending, and increased pressure on profits is making operators turn to technology and innovation to help reduce capex and increase capital efficiency.

## CLEAN ENERGY & OIL CAPEX INVESTMENT



Source: Bloomberg New Energy Finance Clean Energy Investment fact pack

## LCOE IS THE KEY INDICATOR

Levelized cost of electricity (LCoE) is the main indicator to drive investment decisions.

### Key drivers of LCoE for can include:

- Investment cost for system installation
- Cost of capital
- Operation and maintenance cost
- Average annual electricity yield (kW per year)

The energy market is driven by the continuous technology development which is improving the performance of the overall systems and at the same time decreasing costs. This has often been facilitated by attractive financing schemes and low contracted remuneration prices achieved in more markets. The cost of electricity decrease over the last years has stimulated more competitive application development.

Higher conversion efficiency, lower material usage and more innovative manufacturing process are going to set a scene for the future market developments. The cost of generating electricity relies on long term visibility for project costs and grid planning and connection. But large cost variation also depends on the market segment, and solutions chosen.

# Industrial Generators

From 2.5MW to 80MW



# Smartly Standardised Design...

...For Higher Productivity & Lower Risk

## EXPERTISE

### ENABLING FASTER DESIGN, TAILORED TO YOUR REQUIREMENTS

GE has been a leader in innovative generator manufacturing for over 100 years, a wealth of engineering knowledge available through our network of rotating machine engineers.

## DESIGN

### OPTIMIZED EFFICIENCY & POWER DENSITY

Flexible machine design built on standard - rotor & stator - modular solutions.

## ANALYSIS & TOOLS

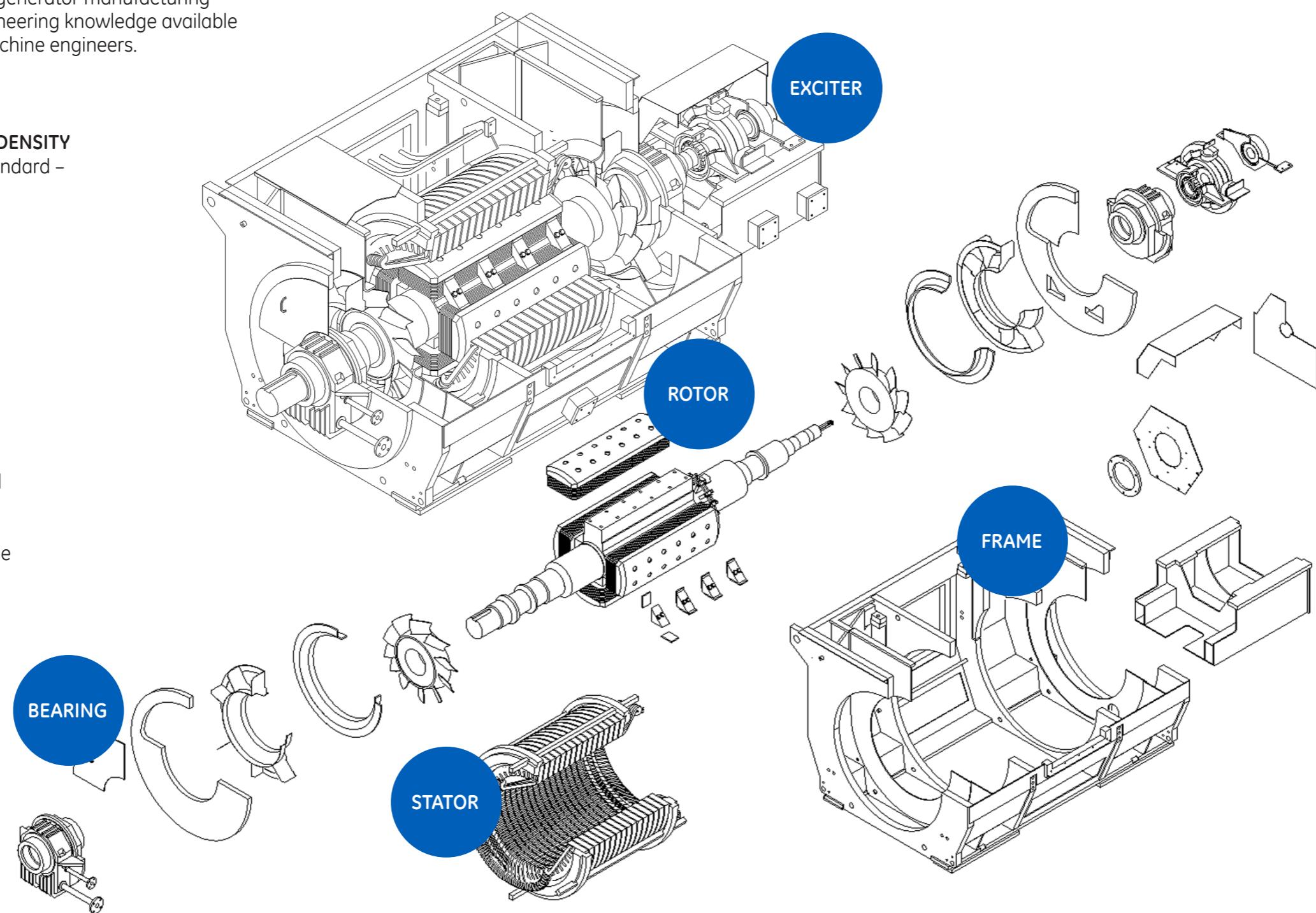
### DE-RISKING

Solutions before installation.

## EXCITATION CONTROL & PROTECTION SYSTEMS

### HIGHER PRODUCTIVITY

Digital control schemes for new and retrofit applications. Innovative GE automatic voltage regulator (AVR) design, helping to maximize machine availability thus productivity, by reducing the time where generator has to disconnect from grid due to



Efficiency of the electrical machines can provide a significant economic impact. Over a year of full production, A 50MW generator with **0.2% better efficiency** can increase electrical power output by up to **\$160k** per year.

## LEADING TECHNOLOGY

### BASED ON PROVEN DESIGN OPTIONS

Innovative insulation and cooling technology. GE patented pin vent technology aiding air flow and heat transfer to extend product lifespan.

## SMOOTH INTEGRATION

### APPLICATION EXPERTISE

# Rotors

## Proven Design Options

### ROTORS



LAMINATED POLE



BOLTED TIP SOLID POLE



INTEGRAL TIP SOLID POLE

#### LAMINATED POLE

- Laminated cruciform assembly
- Wire-on-Edge field windings
- Coils wound directly on poles
- Innovative vee-block designs
- Advanced ventilation and fan designs

This rotor has a laminated cruciform assembly and a wire-on-edge field winding. Each pole face has a set of damper bars brazed to a copper segment at each end, and coil support bars to prevent the ends of the coils from moving in service. After winding and vacuum pressure, impregnation (VPI) treatment, the rotor assembly is shrunk on to the shaft, to ensure a positive fit. The heating process is computer controlled with a number of thermocouples to ensure the rotor is not overheated to protect the insulation and other parts. The shaft material is either of rolled bar or carbon steel forging. The coils are of the wire type, wound directly onto the poles of the generator. The poles are insulated with Class F insulation and

#### BOLTED TIP SOLID POLE

- Class H winding technology
- Improved thermal performance
- Individual bladed fan designs

This rotor has solid poles and a strip-on-edge field winding. The shaft and pole bodies are of integral construction, produced from a single normalized carbon steel forging. After the field coils are fitted, steel pole tips or shoes are bolted to the pole bodies using steel pole screws. The coils are of strip-on-edge construction with inter-turn insulation of epoxy resin impregnated inorganic paper cured under heat and pressure to make fully consolidated units with Class H performance.

At intervals down each coil side, individual turns may be extended to form fins to increase the external surface area and thereby improve the cooling effect. Coils are assembled on epoxy bonded glass laminate washers. Each fully insulated coil unit is then mounted on its salient pole with a suitable restraining arrangement to ensure that it is held firmly against the pole during normal service conditions.

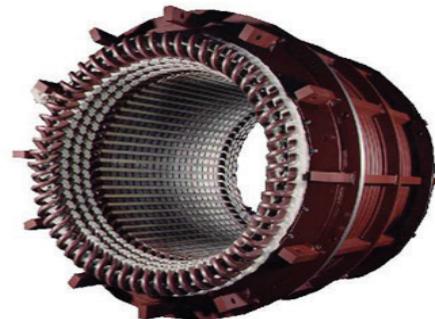
#### INTEGRAL TIP SOLD POLE

The pole tips or shoes on this rotor are machined from the single rotor forging. All other features are the same as the bolted tip rotor. Solid poles hold a strip-on-edge field winding. These types of rotors are used in special 60Hz applications or otherwise specified by customers requiring maximum durability.

# Stators

## Innovative Insulation & Cooling Technology

### STATORS



PIN VENT LAMINATIONS

#### TWO LAYER LAP WINDING

- Low loss lamination grade
- No core-pack welding
- Individual slot wedging
- Thermal vent technology
- Global VPI with rotate cure

#### PIN VENT LAMINATIONS

The stator core assembly consists of varnished laminations of cold rolled low-loss silicon steel, clamped between compression plates. The laminations are supplied in the finally annealed condition, and are insulated to reduce eddy current losses. The Core is built around a central mandrel to help optimise the bore profile.

There are radial ventilation ducts at intervals along the core length, formed by the patented GE Pin-Vent spacers allowing for up to a 5 to 10 % increase in power density over some other techniques.

#### VACUUM PRESSURE IMPREGNATION

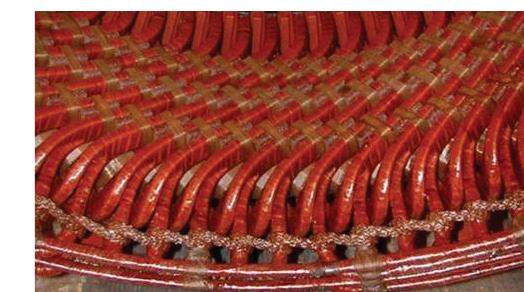
Void free insulation is vital for the life of medium and high voltage insulation systems. The stator is heated in an oven to dry out any moisture. Then it is placed into a pressure vessel where the lid is vacuum sealed. Then resin, at varying temperature, is pumped into the chamber to fill all voids on the stator. After a period of time, dry air is pumped into the top of the vessel creating a "pressure blanket" over the resin, "pushing" it into all remaining voids. The pressure is then released and the stator is placed in an oven for the resin to cure. The stator is rotated during the curing process to ensure that the resin does not run-off and is even throughout.

#### COIL WINDINGS

Stator coils are produced from annealed copper strips insulated with a number of layers of mica tape under armour finishing tapes. The coils are inserted into stator slots using protective liners to prevent damage and are firmly positioned with epoxy glass wedges. The end windings are then securely braced before the complete wound stator undergoes a vacuum pressure impregnation (VPI) process.



VACUUM PRESSURE IMPREGNATION (VPI)

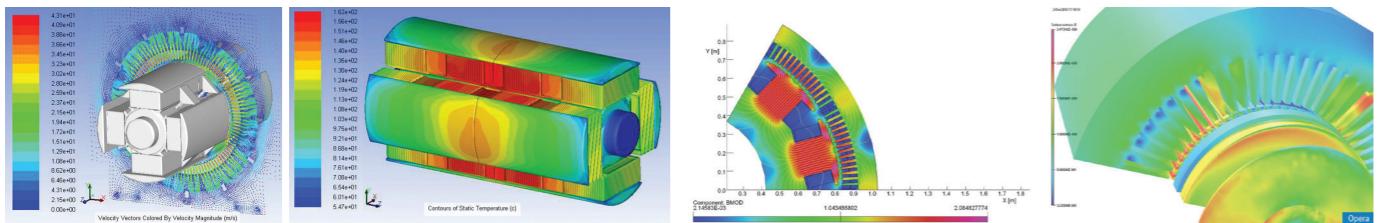


COIL WINDINGS

# Analysis & Modelling

De-risking before installation

GE provides analysis tools for all its generator designs. System modelling and analysing of generator product configurations and performance, helping our generators perform at their best. Implementation of modern analysis tools such as "finite element" delivers much more accurate performance predictions to support our customers both de-risk before installation and also resolve installations in the field efficiently and reliably.



## FINITE ELEMENT

Modern analysis tools such as "finite elements" make predictions regarding performance more accurate. Before integrating the generator with an engine, we are fully aware of the frequencies and so can take steps to avoid exciting them.

## THERMAL & STRUCTURE

We analyze our generator designs to ensure they will not run too hot or be susceptible to natural frequencies and resonances.

## TORSIONAL

Torsional analysis ensures that shaft components perform well under fault conditions.

## TERMINAL BOX INTEGRITY

Through an advanced mathematical simulation we can calculate the effects of an explosion in a terminal box due to an electrical fault. This allows us to optimize integrity of the terminal box during a very rare fault condition.

## FLUID DYNAMICS

Using computer fluid dynamics programs we can more accurately calculate generator cooling and make continuous improvements.

## ELECTRO MAGNETIC FIELD

Using electromagnetic field analysis we can accurately calculate the flux distribution in generators thus calculating things such as losses and efficiency very accurately.

# Excitation Control & Protection

Digital control systems for new and retrofit applications

With over 50 years experience in the design and manufacture of excitation control and protection systems for synchronous machines which have been supplied to power stations, oil and gas platform and other industrial applications around the world - GE offers proven high technology digital control schemes for both new and retrofit applications.



SINGLE CHANNEL EXCITATION CONTROL SYSTEM

DUAL CHANNEL EXCITATION CONTROL SYSTEM

GENERATOR CONTROL & PROTECTION SYSTEM

## BENEFITS

- Programmable Logic Controller (PLC) flexibility allows adding features without replacing the product.
- Option of redundancy for increased reliability
- Proven design with an installed base of tens of gigawatts world-wide
- Compact

## PROGRAMMABLE LOGIC CONTROL TECHNOLOGY

- Flexible and agile
- Easy ladder programming
- Individually designed
- Fully tested and packaged

## FEATURES

- Single and dual channel controller options
- Single or dual convertor options
- Field currents from 1 A to 6000 A
- Ease of commissioning
- Optional standby manual control system for added security
- Calibration and commissioning via laptop or HMI Interface

## FUNCTIONALITIES

- Automatic voltage control
- Automatic field current control
- Automatic VAR control
- Automatic PF control
- Automatic run-up sequencing
- Auto/Manual follow-up
- HMI interface
- Manual restrictive limiter
- Over-fluxing limiter
- Two stage over excitation limiter
- Stator current limiter
- Over/under voltage alarm/trip
- Leading var limiter
- VT fuse failure detector
- Optional power system stabiliser
- Built-in LED alarm indicators
- Quadrature droop control for parallel operation of generators
- Optional cross current control
- Temperature compensation of excitation limiters
- Signal trending
- Optional sequence of events with SNTP/IRIG B time synchronisation

# Gas & Steam Turbine Driven Generators

Modular Construction Synchronous 4 Pole generators

Alpha Range	
Output Range	5,000 to 75,000 (up to 60MW 0.8p.f)
Voltage	up to 15,000 V
Frequency	50Hz or 60Hz
Cooling	Air or Water-cooled



**APPLICATIONS**

- Gas and steam turbine driven
- Prime and stand-by power
- Peaking

Gamma Range	
Output Range	2,500 to 85,000 kVA (up to 80MW)
Voltage	up to 15,000 V
Frequency	50Hz or 60Hz
Cooling	Air or Water-cooled



## MODULAR CONSTRUCTION

Our range of 4 pole generators provides a reliable product based on a modular construction concept utilizing the latest design and manufacturing techniques.

- Efficiency in excess of 98% - Reduces running costs.
- Modular approach to reduce initial investment costs and allow design flexibility
- High availability and reliability - Increases revenue and reduce risks.

## ALPHA FEATURES

The Alpha ( $\alpha$ ) range mounts the global VPI stator within a rigid, fabricated steel housing that allows the stator to be removed vertically without having to remove the end-frames making serviceability easier. Terminal boxes can be mounted on the sides or ends of the stator frame depending upon customer need. The rotor is suspended by end-shield bearings making the generator compact. The external exciter allows for easy maintenance.

## GAMMA FEATURES

The Gamma ( $\gamma$ ) range mounts the VPI stator into a large fabricated steel bed-frame. The arrangement is then enclosed by a steel cover that houses the main terminal boxes and auxiliary connections. This makes servicing much easier. The rotor is suspended via pedestal bearing mounted onto the rigid bedframe. The external exciter allows for easier maintenance.

# Diesel & Gas Engine Driven Generators

Robust Construction Synchronous Multi Pole generators

Beta Range	
Output Range	5,000 to 20,000 kVA (up to 15MW)
Voltage	400 to 15,000 V
Frequency	50Hz or 60Hz
Cooling	Air or Water-cooled



**APPLICATIONS**

- Diesel and gas driven reciprocating engines
- Prime and stand-by power
- Propulsion power for marine vessels

Delta Range	
Output Range	2,500 to 45,000 kVA (up to 40MW)
Voltage	400 to 15,000 V
Frequency	50Hz or 60Hz
Cooling	Air or Water-cooled



## ROBUST CONSTRUCTION

These generators are designed to withstand the rigours of marine and industrial applications, retaining the general features of the generator range.

- Efficiency in excess of 98% - Reduces running costs.
- Modular approach to reduce initial investment costs and allow design flexibility
- High Reliability – Proven in the rigors of Marine Environment
- Certified by the most demanding Marine certifying agencies DNV, ABS, BV, Lloyds.

## BETA FEATURES

The speed range for these machines matches the need of medium and high speed engines with pole numbers ranging from .6 to 22. More poles can be made on these machines if required.

## DELTA FEATURES

This design has the stator mounted into a base-frame with pedestal bearings to support the rotor. These are used in many applications from Prime and Emergency Power to Marine Power. The speed range for these machines matches the need of low speed engines with pole numbers ranging from 6 to 22.

# Permanent Magnet Generators

For Wind Applications

## PERMANENT MAGNET GENERATORS (PMG)

### Technical Data

#### PMG DIRECT DRIVE

- Power range: 3-7 MW
- Voltages: 690V, 900V, 3.3kV
- Rated operating speed: 10-15 RPM
- Efficiency: >94% at full load

#### PMG MEDIUM SPEED

- Power range: 3-8 MW
- Voltages: 690V, 3.3kV
- Rated operating speed: 200-600 RPM
- Efficiency: ~98% at full load

#### PMG STANDARD SPEED

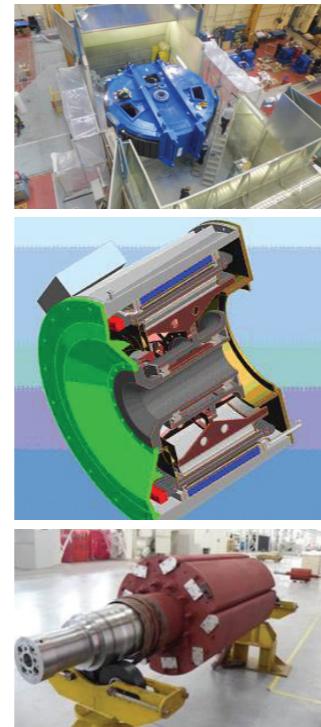
- Power range: 3-6 MW
- Voltages: 690V, 3.3kV
- Rated operating speed: 1000-1800 RPM
- Efficiency: ~98% at full load

### Our Success

- 1st DD PMG commissioned in 2009
- Designed & built numerous units for OEM's
- Serial production for 6MW Haliade turbine commenced in 2015

- 1st geared hybrid PMG 5MW onshore demonstrator in service since 2004
- Other concepts developed directly with different gear box suppliers.

- 0.5+GW installed base in onshore turbines



Our wind generators are designed and built with high technology manufacturing equipment employing VPI (vacuum pressure impregnated) insulation systems giving reliable, robust and optimized designs proven in industrial applications worldwide. Products are optimized to work with our complete range of multi-MW full and partial power converters.

Our generators are designed to help maximize availability, reliability, serviceability and ease of maintenance. We can offer back-to-back testing capability of integrated generator and converter system solutions to support turbine qualification or Highly Accelerated Life Testing (HALT).

# Induction Generators

For Wind Applications

## INDUCTION GENERATORS

### Technical Data

#### DOUBLY FED INDUCTION GENERATOR

- Power range: up to 3.5 MW
- Voltages: up to 13.8 kV
- Network Frequency: 50 & 60 Hz
- Rated operating speed: up to 2200 RPM
- Efficiency: >96%

#### CAGE INDUCTION GENERATOR

- Power range: up to 6 MW
- Voltages: 690V, 3.3kV
- Rated operating speed: up to 1800 RPM
- Efficiency: >96%

### Our Success

- In service since 2002
- Leading supplier for Brazilian market, serial production commenced in 2015
- Proven Wound Rotor Machine Design
- Leading power density

- Proven products in harsh marine and industrial environments.
- Robust and simple rotor designs.



Our generators are designed and manufactured to operate efficiently and reliably in challenging applications and severe environments.

We help to reduce levelized cost of electricity with:

- High electrical efficiency across a broad generating power range
- Optimized systems solutions incorporating our range of full and partial power converters
- Using components proven in diverse industries
- Ease of maintenance enabling lower operation & maintenance cost
- Noise levels as low as 77dBA\* can be met to help reduce the cost for the overall system whilst reducing environmental impact. [\*such as achievable in closed type machines with operating speeds up to 1200 rpm]



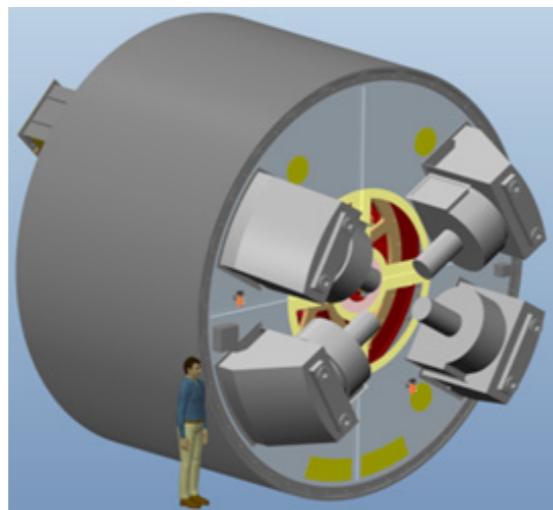
# Variable Speed Induction Generators

For Hydro & Tidal Applications

VARIABLE SPEED INDUCTION	
Output Range	3 to 40 MW
Speed Range	30 to 400 REV/MIN
Voltage	3 to 10 KV selected to suit the converter machine frequency
Frequency	50 or 60 Hz

## APPLICATIONS

- Tidal Lagoon Power Plant developers
- Variable Speed Pump Storage developers
- Variable Speed Hydro schemes



GE is the only company offering induction generators with these power ratings. The variable speed machine allows turbine operation at peak efficiency over a large range of heads and flows. GE offers an integrated system solution combining the induction generator with a converter and also the electrical balance of plant.

Having a proven track record and experience in supplying induction machines for numerous different applications (mine hoists, propulsion motors for marine, high powered motors in Oil & Gas), GE's induction generator has been chosen as the preferred technology for the Swansea Bay Tidal Lagoon Project.

## FEATURES

- Robust and simple rotor construction with no insulated components
- Readily able to withstand the turbine runaway speed
- Smaller envelope
- Minimal maintenance and reduced downtime
- One piece VPI'd stator

## BENEFITS

- Economic solution with high availability and reliability
- Up to 30% saving compared to the equivalent synchronous machine
- Maximizes energy production through use of variable speed enabling up to 50% more energy output
- Simplicity of construction and operation
- Allows operation over an extended range of heads and flows
- Machine can be used for pumping as well as generation
- Optimized speed of operation to maximize efficiency in both generating and pumping operation .

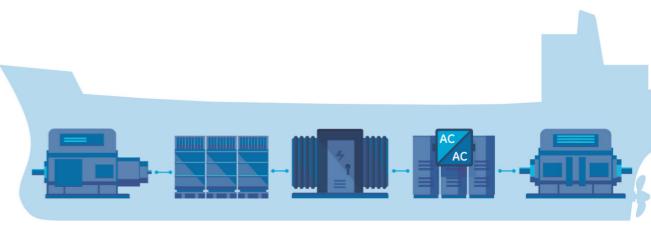
# System Solutions

For Industrial Applications

GE manufactured generators for some of the first commercial and industrial electrical applications. We continue to deliver innovative electrical and mechanical power solutions to the world. Our machines efficiently operate in challenging applications and severe environments where reliability and ease of maintenance is critical.

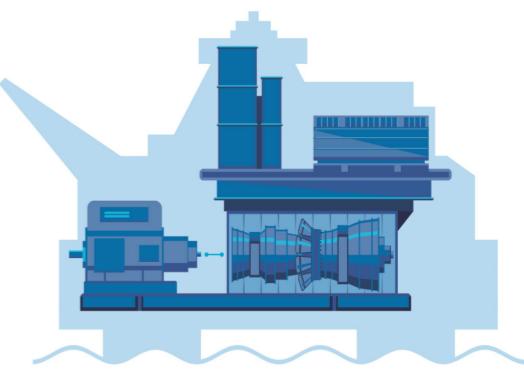
## MARINE

GE supplies high performance propulsion systems for merchant, naval and research vessels including cruise ships, LNG carriers and tankers. Our systems include generators, power distribution, inboard and outboard electric propulsion systems and vessel control. Our extensive track record and well-established brand name result from our leading position in the marine market over many years.



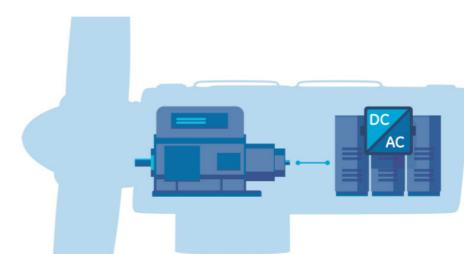
## OIL & GAS

Electrical machines are used in both onshore and offshore industries for driving pumps and compressors and generating power. They can be used for fixed or variable speed applications. GE is able to supply fully customized electrical system solutions all along the value chain from extraction (including subsea compression) to pipelines and storage, refineries, petrochemical and Liquified Natural Gas (LNG) plants.



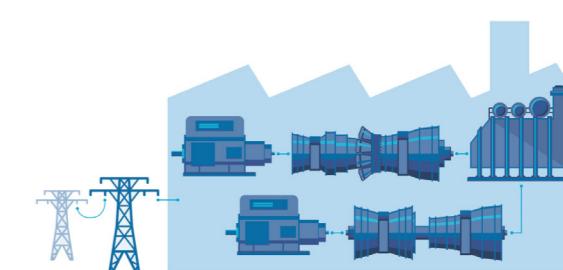
## RENEWABLES

GE provides complete electrical systems: generators, converters, including direct-drive and hybrid Permanent Magnet Generator (PMG) solutions and automation systems. These technologies are well suited to environments requiring low maintenance and are used in offshore and onshore wind turbines, wave and tidal technologies.



## INDUSTRY

GE provides generators up to 100 MW, motors, drives, automation & control for central and distributed, fossil and renewables driven power generation systems, wherever electricity is produced to feed into the grid, or to fuel industrial processes such as in mining, mills, or a range of other industries.



\*Visit [www.powergen.gepower.com/products/generators](http://www.powergen.gepower.com/products/generators) to learn more about GE's generator range up to 1000+ MW

# Services...

# ...Across the product life cycle

## CARING FOR YOUR NEEDS

At GE, we understand that the goals of your organization are demanding, and evolving. To help you meet these goals here at GE Power Conversion we provide a service that goes beyond just waiting for your call.

We offer a comprehensive range of aftermarket services including replacement units, field services, spares, in-shop repairs, service agreements, unit upgrades and technical support. Our mission is to satisfy our customers needs in the aftermarket of power generation.

## INSTALLATION & COMMISSIONING

Installing with confidence. Our team of field service engineers are on hand to ensure your assets go into active service functioning efficiently.

## TRAINING PROGRAMS

Through our in-depth training modules we provide our customers with the knowledge and skills to operate and maintain equipment in the field.

## INSPECTION & REPAIR

We offer a broad array of generator, excitation and protection relaying inspection and repairs services, supported through our international network of GE specialists and service shops.

Our team of project management experts are available to support and schedule your overhaul requirements, working with you to ensure that you are provided regular project updates and work is completed to your satisfaction on time.

## OEM SERVICES FOR ALL HISTORICAL RUGBY INSTALLED BASE



ASSOCIATED+ELECTRICAL+INDUSTRIES

GEC ALSTHOM

ALSTOM



CONVERTEAM  
THE POWER CONVERSION COMPANY



## SERVICE CONTACT CENTERS

Our global service call center is available 24 hours a day, 7 days a week. Supporting our customers to register and assign your enquiry to the appropriate expert team within the GE Power Conversion technical network for assistance.

Contact our global service call centre\* by telephone or email: [escc.geem@ge.com](mailto:escc.geem@ge.com).

France	+33 177312323
Germany	+49 69 66125588
India	+91 44 496 80008
UAE	+971 2 6994931
UK	+44 1788 563800
USA	+1 844 4374474
China	+86 400 021 5605
ANZ	+61 1300 193 189

\*Note that you may be charged different rates when calling from a mobile. Toll free numbers are toll free only in certain countries. Please check with your local provider.

## ENHANCED TECHNICAL SUPPORT

We offer enhanced technical support to customers with service agreements. Our enhanced technical support agreements are designed to suit your specific needs including the availability of 24/7 on-call technical assistance, remote support and immediate mobilization to emergencies.

## SPARES AND CONSUMABLES

The GE Parts team is available to advise the appropriate spares and consumable parts for you to hold in stock. For those emergencies - the team will provide the parts you need on time and at the quality you expect.

## DIAGNOSTICS AND SPECIALIZED

Delivering state of the art test and diagnostic services, our specialist field engineers will apply our in house analysis tools to analyse the asset's performance. Working with you to resolve issues on installations in the field efficiently and reliably.

## UNIT UPGRADES

To extend the life of your asset, our engineering design team will provide you with suitable upgrade options aligned to meet your technical specification and requirements to improve efficiency, production and to reduce emissions.

## SERVICE FOR A LIFETIME

Our goal is to provide you with a complete product life-cycle solution, to minimize risk and help you get the most out of your asset.

## We're at work with you

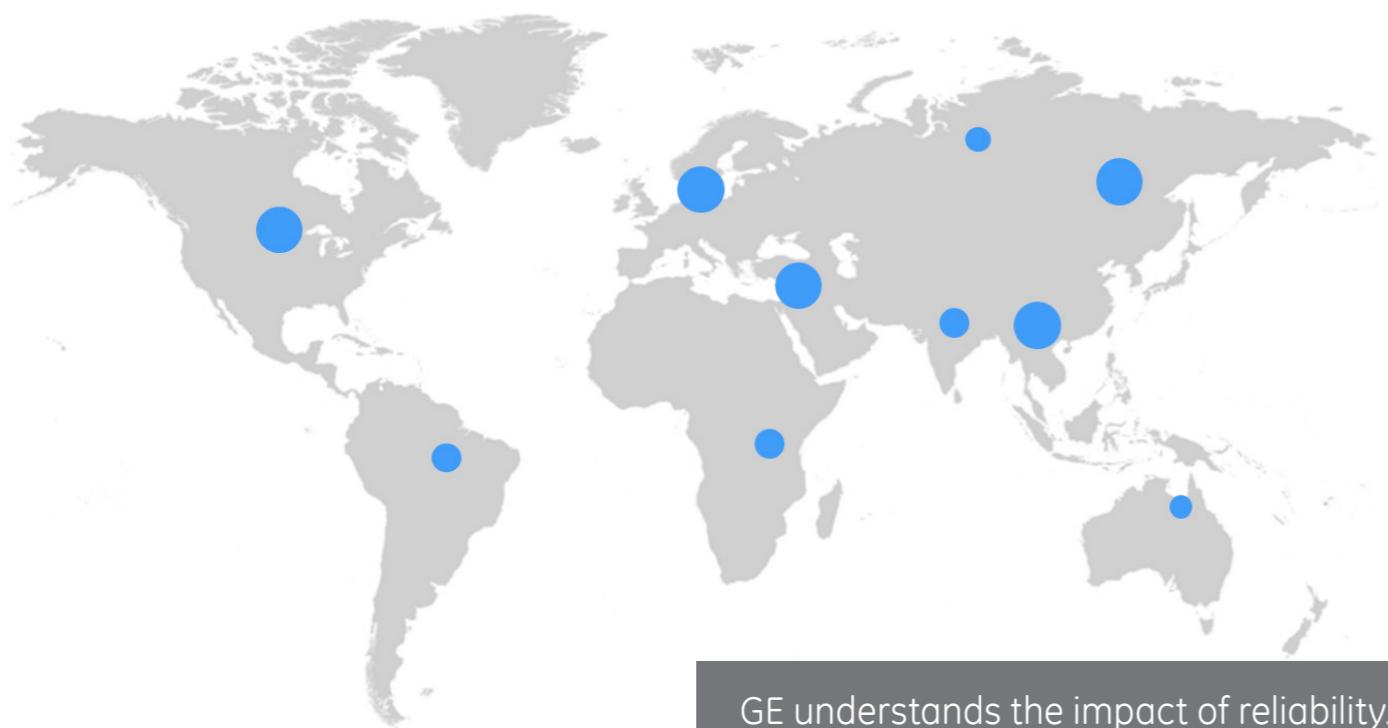
Wherever you are across the globe... We're adding people, parts and perspective to your everyday operations. Helping to keep your operations running smoothly... for the long term

# Our Success

Powering on-and offshore applications across the globe

3450+ Installed units worldwide

4500+ MVA Installed



GE understands the impact of reliability. A 50-MW generator can produce electricity output worth in excess of **\$200k every day** and our availability figures are among the best in the industry.

# Proven Expertise



## MARINE

The U.S. Navy's amphibious assault ship USS Makin Island features the best of GE's power and propulsion technology. The hybrid propulsion system, comprising two GE LM2500+ gas turbine direct drive power units and GE's auxiliary electric propulsion system, enables the ships to choose the appropriate, effective, and efficient form of propulsion for each operational scenario.



## OIL & GAS

Power Conversion supplied Alpha generators for Ichthys LNG project, near Australia. This was due to the flexibility in design that suited the application perfectly. Upon completion, the Ichthys facility is expected to produce 8.4 million tonnes of LNG each year and 1.6 million tonnes of liquid petroleum gas annually, along with about 100,000 barrels of condensate a day at peak operating times.



## RENEWABLES

GE's Permanent Magnet Generator (PMG) is to be installed in GE's Haliade™ 150-6MW offshore wind turbine in Denmark. The turbine's power yield is 15 percent higher than that of other same-generation wind turbines, each is capable of supplying 5,000 households per annum.



## INDUSTRY

GE's Power Conversion business provides customized solutions including hydro generators, low and medium voltage converters for start-up operation, pump operation and excitation systems as well as pump storage variable speed main drives (VARSPEED). GE is a leading supplier of equipment for variable-speed pumped-storage power plants in Europe.

